Module 2: Airway

Lesson 2-1

Airway Objectives

Objectives

Objectives Legend

C=Cognitive A=Affective P=Psychomotor

1 = Knowledge level
2 = Application level
3 = Problem-solving level

Cognitive Objectives

At the completion of this lesson, the First Aid student will be able to:

2-1.1 Describe the major structures of the respiratory system. (C-1)
2-1.2 Describe the signs of inadequate breathing. (C-1)
2-1.3 Describe the steps in the head-tilt chin-lift (Chin-lift without Head-tilt). (C-1)
2-1.4 Relate mechanism of injury to opening the airway. (C-3)
2-1.5 Describe how to ventilate an ill or injured person with a resuscitation barrier device. (C-1)
2-1.6 Describe the steps in providing mouth-to-mouth and mouth-to-stoma ventilation. (C-1)
2-1.7 Describe how to clear a foreign body airway obstruction in a responsive adult. (C-1)
2-1.8 Describe how to clear a foreign body airway obstruction in an unresponsive adult. (C-1)

Optional Infants and Children

- Describe how ventilating an infant or child is different from an adult.
- Describe how to clear a foreign body airway obstruction in a responsive infant/child.
- Describe how to clear a foreign body airway obstruction in an unresponsive infant/child.

Affective Objectives

At the completion of this lesson, the First Aid student will be able to:

2-1.9 Explain why airway protective skills and basic life support ventilation take priority over all other basic life support skills. (A-3)
2-1.10 Demonstrate a caring attitude towards ill or injured persons with airway problems who request emergency medical services. (A-3)
2-1.11 Place the interests of the ill or injured person with airway problems as the

foremost consideration when making any and allemergency care decisions. (A-3)

Psychomotor Objectives

At the completion of this lesson, the First Aid student will be able to:

2-1.12 Demonstrate the steps in the head-tilt chin-lift. (P-1,2)
2-1.13 Describe the steps in the chin-lift without head-tilt.(P-1,2)
2-1.14 Demonstrate the steps in mouth-to-mouth ventilation with body substance isolation (barrier shields). (P-1,2)
2-1.15 Optional - Demonstrate how to use a resuscitation mask to ventilate. (P-1,2)
2-1.16 Demonstrate how to clear a foreign body airway obstruction in a responsive adult. (C-1)
2-1.17 Demonstrate how to clear a foreign body airway obstruction in an unresponsive adult. (C-1)

Optional Infants and Children

- Demonstrate how to ventilate an infant or child.
- Demonstrate how to clear a foreign body airway obstruction in a responsive infant/child.
- Demonstrate how to clear a foreign body airway obstruction in an unresponsive infant/child.

Preparation

Motivation:

An ill or injured person without an airway has no chance of survival. It is essential for the First Aider to be able to manage an airway with and without resuscitation barriers.

Prerequisites:

Preparatory

An ill or injured person without an airway has no chance of survival. It is essential for the First Aider to be able to manage an airway with and without resuscitation barriers.

Materials

AV Equipment:

Utilize various audio-visual materials relating to first aid. The continuous development of new audio-visual materials relating to first aid requires careful review to determine which best meet the needs of the program. Materials should be edited to ensure that the objectives of these guidelines are met.

Equipment:

Training manikin(s), resuscitation mask(s), barrier device(s).

Recommended Minimum Time to Complete:

See page 12 of Instructor's Course Guide

Presentation

I. The Respiratory system
   A. Function
      1. Deliver oxygen to the body
      2. Remove carbon dioxide from the body
   B. Components/anatomy
      1. Nose and mouth
      2. Epiglottis - a leaf-shaped structure that prevents food and liquid from entering the trachea during swallowing
      3. Windpipe (trachea)
      4. Lungs
      5. Diaphragm
   C. Physiology
      1. Diaphragm moves down, chest moves out, drawing air into the lungs (inhalation)
      2. Exchange of oxygen and carbon dioxide in the lungs
      3. Diaphragm moves up causing air to exit the lungs (exhalation)
   D. Infant and Child Considerations (Optional)
      1. All structures are smaller and more easily obstructed
      2. Infants and children's tongues take up proportionally more space in the mouth
      3. Trachea more flexible
      4. Smaller lung capacity.
      5. Large head to body ratio may require different positioning of the head for airway management.
      6. Primary cause of cardiac arrest is respiratory arrest.

II. Opening the Airway
   A. After activating the EMS system, the most important actions that the First Aider can perform is opening the airway of an unresponsive ill or injured person.
      1. An unresponsive ill or injured person looses muscle tone, and the soft tissue and base of the tongue may occlude the airway.
      2. The tongue is the most common cause of airway obstruction in an unresponsive ill or injured person.
      3. Since the tongue is attached to the lower jaw, forward displacement of the jaw will lift the tongue away from the back of the throat
   B. Head-tilt chin-lift
      1. The method of choice for opening the airway in uninjured persons
      2. Research has indicated that the head-tilt chin-lift consistently provides the optimal airway.
      3. Used for uninjured, unresponsive persons.
      4. Technique
         a. Place your hand that is closer to the person's head on his/her forehead, apply firm backward pressure to tilt the head back.

b. Place the fingers of your hand that is closer to the person's feet on the bony part of his/her chin.
c. Lift the chin forward and support the jaw, helping to tilt the head back.

5. Precautions
   a. Finger must not press deeply into the soft tissues of the chin as this may lead to airway obstruction.
   b. The thumb should not be used for lifting the chin.
   c. The mouth must not be closed.

C. Chin Lift without head-tilt.
1. Indications
   a. Used for trauma victims
   b. Used for unresponsive persons
2. Technique
   a. Chin-lift without head-tilt.

III. Inspect the Airway

A. An unresponsive ill or injured person may have fluid or solids in the airway that may compromise the airway.
B. Responsive ill or injured persons who cannot protect their airway should also have their airways inspected.
C. Indications
1. All unresponsive ill or injured persons.
2. Responsive ill or injured persons who may not be able to protect their own airways.

D. Technique
1. Open the ill or injured person's mouth with a gloved hand.
2. Look inside the airway.
   a. Clear
   b. Blocked
   c. Fluid
   d. Solids
   e. Teeth, including dentures

IV. Clearing the Compromised Airway and Maintaining the Open Airway

A. There are two ways that First Aiders can clear or maintain an airway.
B. These techniques are not sequential; the situation will direct which technique is most appropriate.
C. There are two methods of clearing and protecting the airway from liquids or solids.
1. The Recovery Position
   a. The first step in maintaining an open airway
   b. Uses gravity to keep the airway clear.
   c. The airway is likely to remain open in this position.
   d. Unrecognized airway obstructions are less likely to occur.
   e. Monitor the ill person until additional EMS arrives and assumes care.
   f. Allows fluids to drain from the mouth and not into the airway.
   g. Used in unresponsive, uninjured person, breathing adequately
   h. Technique

(1) Raise the person's left arm above his/her head and cross the person's right leg over the left.
(2) Support the face and grasp the person's right shoulder.
(3) Roll the person toward you onto his or her left side.
(4) Place the person's right hand under the side of his/her face.
(5) The person's head, torso, and shoulders should move simultaneously without twisting.
(6) The head should be in line with the body if possible.

2. Finger sweeps
   a. Uses your fingers to remove solid objects from the airway.
   b. Use body substance isolation.
   c. If foreign material or vomit is visible in the mouth, it should be removed.
   d. Do this quickly.
   e. Technique.
      (1) If uninjured, roll the ill or injured person to their side
      (2) Liquids or semi-liquids should be wiped out with the index and middle fingers covered with a cloth.
      (3) Solid objects should be removed with a hooked index finger.

V. Determining Presence of Breathing

A. Immediately after opening the airway, check for breathing

B. As you determine the presence of breathing, look at the effort or work of breathing.
   1. Breathing should be effortless.
   2. Observe the chest for adequate rise and fall.
   3. Look for accessory muscle use.

C. Techniques
   1. Responsive ill or injured persons
      a. Ask: "Can you speak?", "Are you choking?"
      b. The ability to talk or make vocal sounds indicates that air is moving past the vocal cords.
   2. Unresponsive ill or injured persons
      a. Maintain an open airway
      b. Place your ear close to the ill or injured persons mouth and nose
      c. Assess for three to five seconds.
         (1) Look for the rise and fall of the chest
         (2) Listen for air escaping during exhalation
         (3) Feel for air coming from mouth and nose
      d. The First Aider may observe the rise and fall of the chest even if an airway obstruction is present, but will not hear or feel air movement
      e. Some reflex gasping (agonal respirations) may be present just after cardiac arrest. This should not be confused for breathing.

D. Inadequate breathing is characterized by the following
   1. Rate
      a. Less than 8 in adults
      b. Less than 10 in children
      c. Less than 20 in infants

2. Shallow breathing
3. Pale or bluish tissue color, especially in the nails or lips.
4. Changes in level of responsiveness
5. Increased breathing effort
6. Noisy breathing, such as snoring or gasping sounds.

VI. Ventilation

A. Once the airway has been assured, and breathing is assessed, breathing for the ill or injured person may be necessary.
B. If the ill or injured person is not breathing they only have the oxygen in their lungs and their bloodstream remaining.
C. In order to prevent death, the First Aider must ventilate the ill or injured person.
D. There are many techniques for ventilation--the First Aider must be competent in the following techniques of ventilation

VII. Techniques of Ventilation

A. The techniques of ventilation in order of preference are
   1. Mouth-to-barrier device
   2. Mouth-to-mouth
B. Mouth-to-Barrier Device
   1. A barrier device should be used if available.
   2. Some rescuers may prefer to use a barrier device during ventilation.
   3. Barrier devices have no exhalation valve. Air exhausts around the shield.
   4. Barrier devices should have low resistance to delivered ventilation.
   5. Technique
      a. If ventilation is necessary, position the device over the ill or injured person's mouth and nose ensuring an adequate seal.
      b. Keep the airway open by the head tilt-chin lift maneuver.
      c. Give one slow (1-2 second) breath of sufficient volume to make the chest rise.
      d. Too much ventilation is likely to allow air to enter the stomach.
      e. Adequate ventilation is determined by:
         (1) Observing the chest rise and fall
         (2) Hearing and feeling the air escape during exhalation
      f. Continue at the proper rate
         (1) 10-12 breaths per minute for adults, with 1 - 2 second inspiratory time.
         (2) Optional- 20 breaths per minute for infants and children.
      g. If the ventilation cannot be delivered, consider the possibility of an airway obstruction
C. Mouth-to-mouth
   1. The First Aider must be aware of the risks of performing mouth-to-mouth ventilation.
   2. Quick, effective method of delivering oxygen to the non-breathing ill or injured person
   3. Ventilating an ill or injured person with your exhaled breath while making mouth-to- mouth contact
   4. The rescuer's exhaled air contains enough oxygen to support life.

5. Barrier devices and face masks with one way valves are available for use during ventilation.
6. Mouth-to-mask/barrier device does not replace training in mouth-to- mouth ventilation.
7. The decision to perform mouth-to-mouth ventilation on a stranger or ill or injured person with unknown infectious status by First Aiders should be a matter of personal choice.
8. Technique
    a. Keep the airway open by the head tilt-chin lift or jaw thrust maneuver.
    b. Gently squeeze the ill or injured person's nostrils closed with the thumb and index finger of your hand on the ill or injured person's forehead.
    c. Optional -When ventilating an infans, cover the infant's mouth and nose.
    d. Take a deep breath and seal your lips to the ill or injured person's mouth, creating an airtight seal.
    e. Give one slow (1-2 second) breath of sufficient volume to make the chest rise.
        (1) Too much ventilation is likely to allow air to enter the stomach.
        (2) Adequate ventilation is determined by:
            (a) Observing the chest rise and fall
            (b) Hearing and feeling the air escape during exhalation
    f. Continue at the proper rate
        (1) 10-12 breaths per minute for adults, with 1 - 2 second inspiratory time.
        (2) Optional- 20 breaths per minute for infants and children.
    g. If the ventilation cannot be delivered, consider the possibility of an airway obstruction

VIII. Foreign Body Airway Obstructions (FBAO) in the Adult

A. Can be the cause of cardiac arrest
    1. Choking/food
    2. Bleeding into the airway
    3. Vomit
B. Can be the result of cardiac arrest
    1. Vomiting
    2. Dentures
    3. Trauma
    4. Tongue
C. Types of airway obstructions
    1. Partial
        a. Good air exchange
            (1) Ill or injured person remains responsive
            (2) May be able to speak
            (3) Can cough forcefully
            (4) May be wheezing between coughs
        b. Poor air exchange
            (1) Weak ineffective cough
            (2) High-pitched noise on inhalation
            (3) Increased respiratory difficulty

(4) Possibly cyanotic

2. Complete
   a. No air can be exchanged.
   b. Person will be unable to speak, breathe, or cough.
   c. Person may clutch the neck with thumb and fingers--the universal distress signal.
   d. Death will follow rapidly if prompt action is not taken.

IX. Management of the Obstructed Airway

See "Foreign Body Airway Obstruction Management" in the most current version of the Emergency Cardiac Care Committee and Subcommittees, American Heart Association. Guidelines for cardiopulmonary resuscitation and emergency cardiac care (JAMA).

- Partial with good air exchange
- Partial with poor air exchange or complete airway obstructions

X. Optional - Foreign Body Airway Obstruction in Infants and Children

A. More than 90% of childhood deaths from FBAO are in children below the age of 5 years.
B. 65% are infants.
C. FBAO in children is cause by;
   1. Toys.
   2. Balloons
   3. Small Objects.
   4. Food (hot dogs, round candies, nuts and grapes).
D. Should be expected in infants and children who demonstrate a sudden onset of difficulty breathing.
E. Airway obstruction may be caused by infection and should be considered when there is a history of fever with congestion, hoarseness, drooling, or inactivity.
   1. Infection must be distinguished from FBAO.
   2. Attempting to clear the airway of a child with an infection using maneuvers for FBAO is dangerous and unnecessary.
   3. Activate EMS or make arrangements for the child to be seen in a hospital emergency department as soon as possible.
F. The First Aider should only attempt to clear a complete or partial FBAO with poor air exchange.
G. "Blind" finger sweeps are not done in infants or small children.
H. For management of FBAO in infants and children;
   See "Foreign Body Airway Obstruction Management" in the most current version of the Emergency Cardiac Care Committee and Subcommittees, American Heart Association. Guidelines for cardiopulmonary resuscitation and emergency cardiac care (JAMA).

XI. Special Considerations

A. Persons with stomas
   Persons who have undergone a laryngectomy (surgical removal of the voice box) have a permanent opening (stoma) that connects the trachea to the front of the neck.When such person requires rescue breathing, mouth-to-stoma ventilations are required.

B. Technique
    1. Make an airtight seal around the stoma. Use a barrier if possible.
    2. Deliver a ventilation slowly, allowing the chest to rise.
    3. After delivering the ventilation, allow time for the person to exhale.
    4. Some persons have partial laryngectomies. If air escapes from the mouth or nose when ventilating the ill or injured person through the stoma - close the mouth and pinch the nostrils.
C. Optional - Infant and Children Place an infant's head in a neutral position. Extend a little past neutral for a child.
    1. Take care not to over extend the infant or child's head/neck.
    2. Limit the amount of ventilation to that which makes the chest rise.
    3. Avoid excessive ventilation volumes that may force air into the stomach.
D. Dental appliances
    1. Dentures - ordinarily dentures should be left in place.
    2. Partial dentures (plates) may become dislodged during an emergency. Leave in place, but be prepared to remove it if it becomes dislodged.

Application

Procedural (How)

1. Show visual representations of the airway and respiratory system of adults. (optional - children, and infants).
2. Show examples of inadequate breathing.
3. Demonstrate the head-tilt, chin-lift method of opening the airway.
4. Demonstrate ventilation of a ill or injured person with a barrier device and/or resuscitation mask.
5. Demonstrate mouth-to-mouth ventilation of a ill or injured person.
6. Show examples of inadequate breathing.
7. Demonstrate the head-tilt, chin-lift method of opening the airway.
8. Demonstrate ventilation of a ill or injured person with a barrier device and/or resuscitation mask.
9. Demonstrate mouth-to-mouth ventilation of a ill or injured person.
10. Optional - Demonstrate ventilation of an infant or child ill or injured person.

Contextual (When, Where, Why)

Every ill or injured person must have an open airway to survive. When the airway is obstructed, the First Aider must clear it as soon as possible using the methods described in this lesson. Once the airway has been opened, the First Aider must determine if breathing is adequate. Unresponsive ill or injured persons with inadequate breathing may need to be ventilated.

Student Activities

Auditory (Hearing)

1. The student should hear presentations of ill or injured persons with abnormal breathing.
2. The student should hear a manikin ventilated with a resuscitation mask/barrier device.

Visual (Seeing)

1. The student should see visual representations of the airway and respiratory system.
2. The student should observe normal breathing in other students.
3. The student should see visual representations of abnormal breathing.
4. The student should see visual representations of ill or injured persons with stomas.
5. The student should see different devices for ventilating ill or injured persons (resuscitation masks, barrier devices).

Kinesthetic (Doing)

1. The student should practice evaluating breathing.
2. The student should practice opening the airway with the head-tilt, chin-lift maneuver.
3. The student should practice mouth-to-mouth ventilation.
4. It is recommended that the student should practice ventilation of an ill or injured person with a resuscitation barrier and/or mask (using a manikin).
5. The student should practice techniques for clearing a FBAO.

Optional - The student should practice ventilating an infant or child ill or injured person.

Instructor Activities

1. Facilitate discussion and supervise practice.
2. Reinforce student progress in cognitive, affective, and psychomotor domains.
3. Redirect students having difficulty with content.

Evaluation

Evaluate the actions of First Aid students during role play, practice or other skill stations to determine their comprehension of the cognitive and affective objectives and reasonable proficiency with the psychomotor objectives.

Remediation

Identify students or groups of students who are having difficulty with this subject content.

Enrichment

Address unique student requirements or local area needs concerning this topic.